

Chapter 2



Motion in One Dimension

Section 2.1

Displacement

- Definition: A vector that points from an object's initial position to its final position and has a magnitude that equals the shortest distance between the two positions
- Symbol: Δx
- Base Metric Unit: meter (m)
- Formula: $\Delta x = x - x_0$

Displacement vs. Distance

- Displacement is only concerned with starting point and ending point. It does not account for what happens in between. Direction is accounted for.
- Distance is the length of the entire path traveled by an object. Direction is not accounted for.

Example

- A bee flies north 31 meters, then turns east and flies 15 meters. After that, the bee flies south 31 meters. Finally the bee flies west 7 meters.

A) What distance did the bee travel?

B) What is the bee's displacement for the entire trip?

Speed and Velocity

- Δt represents change in time $t - t_0$
- since t_0 is usually the starting point, we can replace Δt with t most of the time.
- Average velocity = Displacement/Elapsed Time
- $\mathbf{v} = \Delta \mathbf{x}/t$
- It is measured in (m/s)

Difference between Speed and Velocity

- $\text{Speed} = \text{Distance} / \text{Time}$
- Speed does not account for direction
- Instantaneous velocity
- Instantaneous speed